The

Cane Growers' Quarterly

—Bulletin—

VOL. VIII 1 OCTOBER, 1940 No. 2

Varietal Resistance to Cane Grubs.*

By R. W. MUNGOMERY and J. H. BUZACOTT.

OF the several angles from which attempts can be made to minimise cane damage from grub attack, not the least important is that of varietal resistance.

A variety which is more or less resistant to grubs can be useful in many ways. Firstly, without fumigation it will frequently survive a moderate grub population sufficiently for the cane to be harvested, whereas the susceptible variety under the same conditions will often deteriorate so greatly that, even at the beginning of the crushing season, the C.C.S. will be below that value acceptable by the mill. Secondly, the resistant type will probably not be stopped in growth until the grubs are at least in the third stage, whereas the growth of susceptible varieties may cease when grubs are in the second stage; thus the partially resistant cane will have a longer growing period and consequently there will be more cane to harvest from it. Thirdly, where heavy infestation has occurred or when beetle flights have taken place over an extended period, a fumigation campaign is rendered much easier if the variety concerned is moderately resistant, as either the fumigation may be left until grubs concentrate under the stool or, where erratic flights have occurred, fumigation may be carried out at the optimum time without the fear that an odd grub or two, which may come in from a later flight, will cause serious damage. Fourthly, one of the most valuable considerations is the fact that resistant varieties have a better chance of giving a good ratoon crop. The variety of which the roots have been completely destroyed is picked up holus bolus by the cutter and the butt lopped off and allowed to fall anywhere, so that it is frequently impossible to save the ratoon even by the expedient of ploughing soil on to the damaged stools. The stools of a resistant variety usually remain attached to the ground by at least a few roots and consequently cutters remove the cane and leave the stools in position.

* Paper presented at Annual Cane Pests Boards Conference, held at Ayr, 1940.

Resistance is achieved by a variety in more than one way. In the first place there is that type of resistance which may be classed as direct resistance and which is a function of the rooting system. It is believed that the resistant properties in this case depend not only on the type of rooting system, i.e., surface or deep, nor only on the bulk of roots produced, but rather, in addition, on the power to reproduce roots rapidly after root pruning has taken place. So far insufficient work has been done to enable us accurately to classify root systems of present commercial varieties but it is known that the variety S.J. 4 belongs to this latter category and is the most resistant variety to grubs (with the possible exception of P.O.J. 2725) that we have yet examined.

With regard to those canes which have a comparatively large bulk of roots but whose power to regenerate roots is less complete, these have moderate resistance and although their root system may be badly damaged, they usually have sufficient roots intact to enable the cane to keep alive. Therefore, although the cane may mature earlier than usual by virtue of the severe root pruning and stoppage of growth, the cane, in maintaining a few roots intact, tends to hold its high sugar content over a period longer than would be the case if the roots were totally destroyed; furthermore the root system is sufficiently large and strong so that the cane continues to grow for some time after the grubs have commenced operations. To this class P.O.J. 2878 apparently belongs, although with this variety some of the trouble experienced is due to the fact that the length of stick tends to lever the basal portion of the stool out of the ground, long before all the roots have been destroyed.

Again, certain canes prove resistant to grubs by virtue of the fact that they attract less ovipositing beetles. The reason for this is that they either have a sparse top and present less cover, or they show less early vigour and therefore are shorter in the stalk at the time of beetle flight. The appearance of such varieties during a grubby season frequently leads farmers to the erroneous conclusion that the variety has survived an attack from a number of grubs equal to those infesting a susceptible neighbouring cane which has been badly damaged. The only way to estimate the comparative resistance of varieties is to have them growing alongside one another planted at the same time and under the same conditions, and after grub infestation has occurred, to make a number of diggings in each variety to determine the average number of grubs per stool. An interesting case of differential infestation occurred this year in the Gordonvale area. In the same block three strips of cane had been planted, viz., Q. 29, Q. 10, and Oramboo. During March and April of this year serious damage showed up in Q. 10 and moderate damage in Oramboo, whereas no sign of damage appeared in Q. 29. Diggings were made during April and the Q. 10, of which the root system was completely destroyed in places, showed an average infestation of 10·7 grubs per stool, the Oramboo 4·9 per stool, whilst the Q. 29 showed only 1·4 per stool. Now Q. 29 has a somewhat sparse top and moreover makes slow growth till it commences to make cane when it begins to grow more rapidly; Q. 10, on the other hand, has a heavier top and makes very rapid early growth. At beetle flight, the Q. 10 would have been taller than either Oramboo or Q. 29 and therefore apparently received a much greater number of the egg laden female beetles. Actually, when the observations on grub damage were made, the Q. 29 was the tallest of the

three varieties and this fact could easily lead to erroneous conclusions if the relative infestations were not known.

During this year a number of diggings have been made in varieties which showed differential grub damage and some observations have also been made in previous years. It should be noted that these diggings must not be carried out too late in the season as frequently a large mortality occurs amongst the grubs due to bacterial or fungus diseases and the depredations of parasites and predators; diggings made later than April or May would probably not present a true picture of the original comparative infestation.

Our recent examinations have revealed that, under conditions of moderate infestation, P.O.J. 2725 is very resistant to grub attack and shows neither uprooting nor withering of the top. P.O.J. 2878 shows less resistance than P.O.J. 2725 but considerably more resistance than Badila, Korpi, or Oramboo which latter three must be classed as susceptible varieties. P.O.J. 2878 showed considerable uprooting and much dead tissue in tops in all plots examined, but many of the stools were still attached to the ground by a few roots and the variety had made much more cane than Badila or Korpi of which the roots were more or less completely severed.

Q. 10 would appear to be susceptible although in our diggings this year the variety presented a much heavier infestation than neighbouring canes and an accurate idea of its reaction could not be gained. It is doubtful whether any known commercial variety would long survive an average population of 10·7 third stage grubs per stool.

Co. 290 showed a fair amount of damage at Gordonvale but not so severe as Korpi growing alongside and carrying the same infestation. Furthermore there was a greater amount of cane on the Co. 290 than on the Korpi.

In each instance where observations were made on Q. 29 it showed a much smaller infestation than its neighbours.

When reviewing these results it must be remembered that varieties may not behave in the same way every year or in different types of soil. For instance, this particular year was very wet in the area where these observations were made, the soil in most cases had a fairly high clay content, and the grubs were for most of the season located near the surface. Under these conditions of attack the roots had been completely eaten through not far below the surface. Under dryer conditions, when grubs would be located deeper in the ground, a variety with a large but shallow rooting system might have sustained less damage.

The resistance shown by P.O.J. 2725 seems to warrant a trial of this variety in grubby areas. Although it presents one or two undesirable agricultural features such as early arrowing and low sugar content, its resistance to downy mildew and gumming diseases render it a safe variety to grow in areas in which those diseases occur. So far, in northern areas, even where it has been on the approved list, P.O.J. 2725 has not been extensively grown.

Ratoons from the plots in which diggings have been made will be watched with interest as ratooning is one of the points on which the resistant variety scores most heavily.

Notes on the Use of Varieties in Lessening Grub Damage to Cane.*

By W. A. McDougall.

OBSERVATIONS on the use of different varieties as a help in lessening "grey-back" grub damage to cane have been carried out for a number of years in the Mackay district. It has been considered for some time that, as far as local conditions allow it, the growing of so-called grub-resisting varieties in grub infested country is of primary importance in the fight against grubs. Organised fumigation is the secondary phase in the control of these pests.

In selecting or recommending any variety for the purpose under discussion two points, as follows, have been considered:—

(1) In most instances the grub resisting variety should have general agricultural qualities at least very little inferior to the standard varieties of the particular area.

(2) The reaction of the varieties to different grub populations in different seasons under varying conditions.

Elaborating these points: it is submitted that the grub pest after all is more or less the concern of the individual farmer rather than that of the community as a whole. Therefore the using of varieties against grubs, although it may be for his own good, is to a large extent a voluntary effort on the part of the farmer concerned. In the Mackay district grub infestations are, as in most areas, intermittent. It has been found most difficult to establish permanently a grub resistant variety in any area and to any worthwhile extent unless it has given general satisfaction over a number of years. The possibility of its helping to resist grub attacks, if called on to do so, in say two years out of five, will not alone suffice to carry the variety along.

As for the actual grub resisting qualities of varieties; we do not know of any variety which, at times, cannot be severely damaged by grubs. In one locality or soil type variety A may appear to be better than B (grub populations being similar), whereas the position is reversed elsewhere. Furthermore, under certain conditions P.O.J. 2878, for example, will withstand an attack from a population of 8-10 grubs per stool, and in different circumstances 4 grubs per stool may be sufficient to cause damage. So far as Mackay is concerned varieties have been grouped as follows:—

Grub resistant: P.O.J. 2878 and P.O.J. 2714.

Grub susceptible: S.J. 2, Oramboo, Korpi, H.Q. 426, Q. 813, Q. 20, and N.G. 15.

Intermediate: E.K. 28.

Co. 290 was thought to have possibilities as a grub resister. In the only grub surveyed field of this variety to date 3 grubs per stool inflicted the damage. P.O.J. 2725 is, to us, a more recent cane than P.O.J. 2878. By some it is considered to have more general disadvantages than has P.O.J. 2878 (when disease free) under Mackay conditions. Lately,

* Paper presented at Annual Cane Pests Boards Conference, held at Ayr, 1940.

however, it has been suggested to farmers as worthy of a trial in areas where P.O.J. 2878 is not now approved and where large grub populations are seldom encountered. This particularly applies to irrigated lands and where rats are not prevalent.

A Useful Hint when Land Grading.

Most farmers, when grading for drainage or irrigation, do not have access to a surveyor's level or other device to enable them to determine when they have scooped just sufficent soil to provide the surface slope required.

One Burdekin farmer has evolved a very ingenious method to provide him with the information he needs in this respect. He can determine accurately the condition of the surface, without any guesswork, merely by using two or three petrol or kerosene tins and an ordinary spirit level.

Fig. 22.—Illustrating the manner in which petrol tins may be used in finding levels.

The tins are set on the loose surface, as shown in the illustration (Fig. 22), and by pressing lightly on one side or the other the top edge of the tin is adjusted until the level shows that it is horizontal. The remaining tins are similarly adjusted. Then by sighting along the top edge of the first tin, it may readily be determined whether the land surface falls away or rises, regularly or irregularly, as evidenced by the corresponding edges of the successive tins.

This little trick is both simple and convenient, as well as accurate.

H.W.K.

Farmers' Field Day, Meringa Station.

THE Annual Field Day was held at the Meringa Sugar Experiment Station on the 8th June last. Though the attendance was by no means large, it was definitely an improvement on that of the previous year, and a number of farmers from Mossman and Innisfail attended.

Fig. 23.—Portion of the group of visitors attending Meringa Station Field Day, 1940.

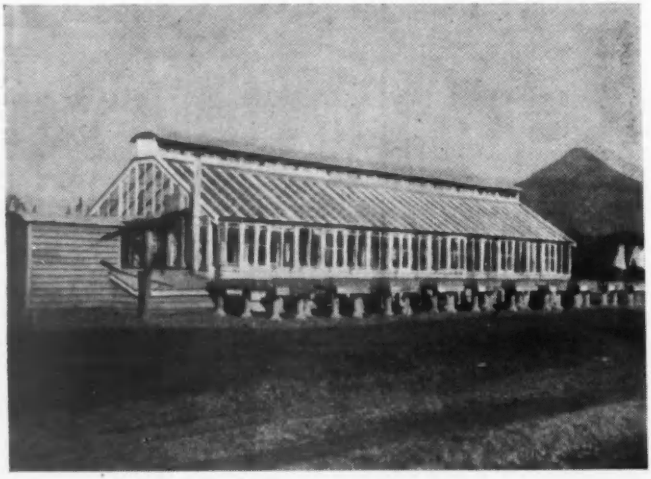

Fig. 24.—Glasshouse at Meringa, with tables for seedling pots in the foreground.

Addresses were delivered by the Director, the Assistant Director, and the Entomologist, while Mr. N. H. Wellard also spoke briefly as Growers' Representative and Deputy Chairman of the Sugar Experiment Stations Advisory Board.

Fig. 25.—Plot of grain sorghums, Meringa.

The Director, in the course of his remarks, made a plea for closer co-operation between canegrowers and the Bureau officers. Though the latter are often called upon to carry out "policing" duties, they find these no less disagreeable than do the farmers who are the subject of their investigations. But if growers would overlook this aspect of the job, which is essential for the communal well-being, they would find that the Bureau is able to offer many useful services, which are not so fully availed of as they might be. In the production of new varieties, in advisory work on pest and disease control, on soil analyses and fertilizer recommendations, there is much the grower could gain.

He went on to explain the application of the approved variety regulations as a measure for the adequate control of infectious diseases: and although the temporary loss of the gum susceptible variety might be regarded as a great hardship by some growers, it is nothing to the loss which the district would incur were the position allowed to drift. The experiences of the southern districts of the State of fifteen years ago are all too vividly remembered to allow such a policy to be countenanced.

Mr. Bell gave an illustrated lecture on cane breeding, along the lines of that already reported in full for the Mackay Field Day. Growers were very interested in following the technique and results of the methods employed in this most important phase of the work of the Bureau.

Mr. Mungomery issued a warning to local growers in reference to the grub pest, which appears to be steadily growing in importance, after a few years of comparative scarcity. He urged the closest attention by

farmers in those sections where grub infestation is probable, and he outlined the means to be employed in dealing with fumigation. Special interest was centred in a demonstration of the new Blundell knapsack injector, the use of which has both facilitated the job of fumigation and reduced labour costs materially.

During the course of the inspectional tour which followed, farmers were afforded an opportunity of seeing some of the new seedlings which have been raised at Meringa in recent years, and which are now in various stages of field trial. A selection of finally selected seedlings, from Meringa and other stations, as well as recent importations from New South Wales and overseas, was closely inspected. Certain of these canes exhibit definite promise for northern conditions.

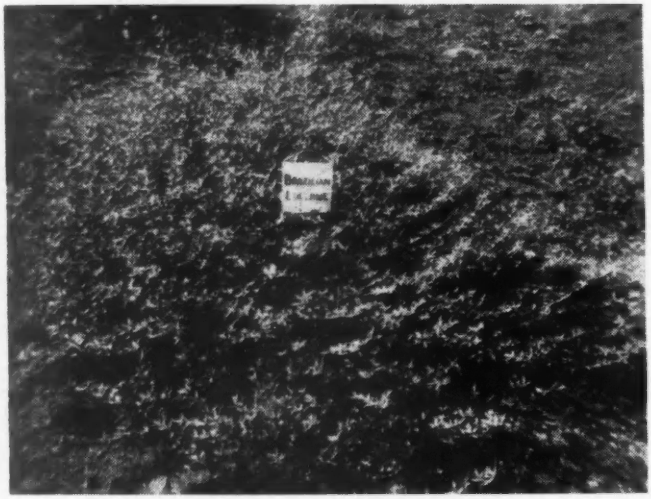

Fig. 26.—A clump of Brazilian lucerne, which shows promise as a pasture legume.

The grain sorghum crops were inspected, and their possibilities received general approval as fodder crops for the North. The legumes which are now undergoing trial also held the interest of farmers, who see in these the means of building up soil fertility on fallow cane lands. Crops of Gambia pea and giant crotalaria were seen in a mature state: a few clumps of Brazilian lucerne (*Stilosanthes guyannensis*) had also showed very satisfactory growth, and it is hoped that this species may thrive in pasture paddocks.

Finally, the various phases of cane seedling production and propagation were explained to the visitors, many of whom expressed themselves as well satisfied that they had spent a pleasant and instructive afternoon on the station.

H.W.K.

Controlling the Maturity of Standover Cane.

In areas where farmers carry a proportion of standover cane, both as standard policy or to avoid the milling of "No. 2 pool" cane, care should be paid to those factors which will influence the maturity of such

crops during the following season, so as to avoid an excess of ripe cane at the time the mill commences crushing.

It has been pointed out elsewhere in this issue that standover crops are generally ripe early in the crushing season. If the farmer has only a small proportion of cane of this class, which he plans to cut when the season commences, nothing need be done to control its maturity. But if he has sufficient "two-year-old" cane to keep him busy for, say, one half of the crushing, it is most desirable that some pre-planning be done to assure that, as far as possible, all standover crops will not ripen at the same time.

Such steps must be taken, of course, at the commencement of the second growing season of the crop. The treatment to be employed is an application of sulphate of ammonia to those crops the maturity of which it is desired to delay. This may involve, in some cases, fertilizing crops which are so well advanced as to make the project impracticable; but in general the farmer will have some cane which is sufficiently backward to permit of the treatment, and the more advanced cane may be left for early harvest.

The treatment may be given any time between, say, November and February, observing the following rule: *The later and the heavier the application of sulphate of ammonia, the greater will be its influence in delaying maturity.* Normally applications of from one to two bags per acre will be satisfactory; and it should be remembered that the treatment will, generally, have a marked influence on the yield of cane per acre, as well as on its maturity.

H.W.K.

The Planting of Sorghums.

From time to time the Bureau of Sugar Experiment Stations has warned canegrowers of the danger of planting maize in cane areas where downy mildew disease exists, in conjunction with susceptible cane varieties. In these circumstances, the use of sorghums is strongly recommended; in fact, it is the experience of many farmers who have heretofore grown maize for fodder purposes that sorghums are much more reliable and satisfactory. There is no danger in feeding sorghum to stock, provided it has flowered. It should not be cut in its early green state.

Two major classes of sorghum are employed—(1) the saccharine or sugary types, such as Saccaline, which owe their food value largely to the sugary juice contained in the stems; and (2) the grain types, which concentrate food, in the form of starches, in the heads.

Seed of Saccaline can be obtained from most reputable seed dealers, while seed of the grain types are obtainable from the Department of Agriculture and Stock. The price charged is 4d. per lb., freight paid. At the present time seed of the following varieties may be obtained:—Kalo (recommended for the wetter districts), Hegari, Texas Black Hull, and Kaffir.

The seed may be sown broadcast (30 lb. per acre) or drilled at the rate of 4-5 lb. per acre. Drilling is recommended, notably for the grain types, as it assures the formation of better heads.

During the past season, very good crops of sorghum were seen in the southern cane areas, while good grain crops were obtained as far north as the Meringa Sugar Experiment Station.

H.W.K.

The McNichol Grader-Leveller.

By H. W. Kerr.

IN recent years cane growers have devoted considerable time and effort to permanent farm improvements which are calculated to enhance both the yielding capacity of the land and the convenience of working the farm. In this respect land grading has been concentrated upon, in its influence on drainage properties of wet blocks, and ease of irrigation in areas such as the Lower Burdekin. This project is one which demands careful forethought and intelligence, so that undue removal of fertile surface soil and the creation of sterile patches may be avoided; and also a high measure of skill in scooping the ridges and depositing the soil in hollows.

During a recent visit to the Mackay district, the writer was interested to see demonstrated an implement which should prove extremely useful as an adjunct to such work; though it was intended rather to put the finishing touches to an otherwise good job of grading, the machine is actually a combined grader and leveller, and under demonstration it was at times moving almost a full cubic yard of loose soil.

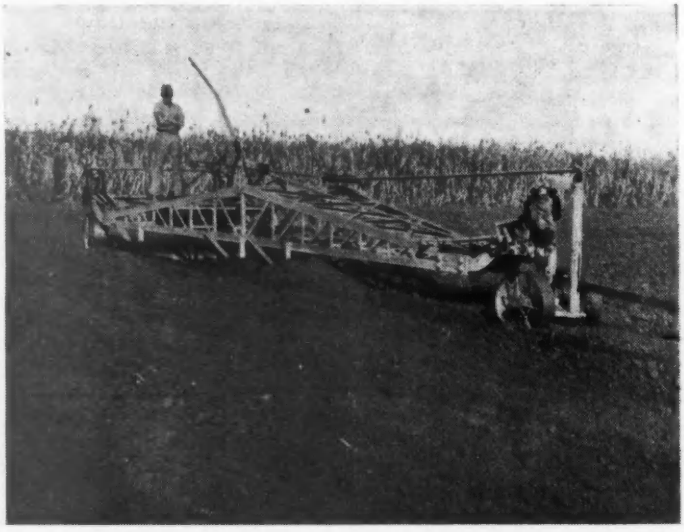

Fig. 27.—The leveller operating in a scooped field.

The accompanying illustrations (Figs. 27, 28) demonstrate the essential features of the unit. It was designed by Mr. W. McNichol, a canegrower of Palmyra, Mackay, who has had extensive experience in converting a poorly-drained area into land of better than average yielding capacity. One of the chief features of the machine is the long wheel base, which is essential for accurate levelling. This machine has an overall length of 30 feet, and a width of 9 feet. By means of levers the elevation of the machine may be adjusted fore and aft on the wheels. It is fitted with three blades, each 1 foot in depth. The front blade,

which is set at right angles to the frame, is 8 feet wide; the middle blade is set at a slight angle to the front blade, and is 8 feet 6 inches wide; while the rear blade, also set at a slight angle, but in the opposite sense from the central blade, is 9 feet wide.

Fig. 28.—Illustrating how readily the leveller may be turned on the headland.

Fig. 29.—An example of the class of work done by the leveller.

The frame of the machine is constructed of ¼ inch angle iron of suitable section, and it is welded into a very strong and rigid unit. It was constructed by a Mackay engineering workshop.

A very interesting feature is the coupling of the front and back wheels in such a manner that they operate in opposite directions, when turning, and the leveller can actually be turned on a headland 25 feet wide.

A high-powered tractor is, of course, necessary for hauling the machine. A 35-h.p. diesel unit is found to be most satisfactory, and it may usually be operated in second or third gear; this is, of course, governed by the load which it is required to move. The depth of the blades may be regulated while working. Where a high ridge is encountered, a large amount of soil may be taken off and carried along until a depression in the surface is met. The efficiency with which the machine is operated may be gauged from the accompanying illustrations (Figs. 28, 29). On this field it was working, with the tractor in second gear, at a speed of 2½ miles per hour. With reasonable field length, 2 acres of land may thus be covered in an hour. For best results, the field should be worked over twice, either in the same direction, or at right angles to one another.

Bundaberg Station Field Day.

Fig. 30.—The Assistant Director explains the pedigree of Q. 25.

A List and Report of all Grub Fumigants and Poisons so far Tried.*

By R. W. Mungomery and J. H. Buzacott.

[From time to time suggestions are made regarding the probable usefulness of poisons or volatile substances in grub control. This paper shows the extent of the investigations which have been made already by officers of the Bureau.—Ed. Note.]

BELOW is a list of the chemicals which have been tried for the control of cane grubs in North Queensland. Some of these either pure or in mixture, are in commercial use at the present time for grub control, but the major number of the chemicals listed have proved quite useless. Some of the substances, in particular certain mixtures, warrant further trial and will be accorded such as opportunity offers.

At the end of the list are comments on those fumigants in commercial use, and notes on those which have showed some promise as grub exterminators.

Inorganic Compounds.

Ammonium sulphate
Arsenicals—
  Arsenic trioxide (white arsenic)
  Calcium arsenate
  Copper arsenate
  Copper arsenite
  Lead arsenate
  Sodium arsenate
  Sodium arsenite
  Copper aceto-arsenite (Paris Green)
  Arsenic chloride
Barium chloride
Barium sulpho-carbonate
Calcium carbide
Calcium carbonate
Calcium oxide
Copper carbonate
Copper sulphate (blue stone)
Potassium cyanide
Potassium chloride (muriate of potash)
Potassium dichromate
Potassium di-nitro-ortho-cresylate
Potassium nitrate
Potassium sulphate (sulphate of potash)
Potassium sulphocarbonate (potassium xanthate)
Potassium xanthogenate (potassium ethyl xanthate)
Sodium ethyl xanthate ("Xanthate")
Sodium chloride (common salt)
Sodium nitrate (nitrate of soda)
Sulphur
Sulphur monochloride
Gas Works by-products—
  Spent liquor No. 1
  Spent liquor No. 2

Organic Compounds.

Acetone
Amyl acetate
Amyl alcohol (fusel oil)
Benzaldehyde
Benzol
Benzene hexachloride
Ortho-di-chlor-benzene (water soluble)
Ortho-di-chlor-benzene (insoluble)
Liquid di-chlor-benzene, mixture of ortho-, meta, and para-dichlorbenzene.
Para-di-chlor-benzene
Nitro benzene
Benzine (petrol)
Benzoline
Benzyl chloride
Carbon disulphide
Carbon tetrachloride
Chloropicrin
Creosote
Epichlorhydrin
Dichlorethyl ether
Ethylene chlorhydrin
Tetra-chlor-ethane
Ethylene dichloride
Ethylene oxide
Trichlor-ethylene
Hellebore
Hexone (methyl-iso-butyl-ketone)
Kerosene
Naphthalene
Nicotine sulphate
Propylene dichloride
Propylene chlorhydrin
Propylene oxide
Pyridine
Pyrethrum
Sinapis Oil (mustard oil)
Tar
Toluene
Turpentine
Mineral turpentine (Dryaline)

* Paper presented at Annual Cane Pests Boards Conference, held at Ayr, 1940.

Proprietary Compounds.

The active principle where known is given in brackets after the trade name. In some of the substances the trade name is applied to the pure substance, e.g., Globol is simply paradichlorbenzene undiluted. Many of these substances, however, contain only a comparatively small amount of the active principle.

Ammon-cent (gas works by-product)
Arresto
Carbolineum (tar-oil emulsion)
Carbosyl
Chlorocide A
Chlorocide B
Clift's Manurial Insecticide
Creolin (tar oil and soap)
Cyanogas (calcium cyanide)
Eulan B
Enceetol (phenols)
Florium
Globol (paradichlorbenzene)
Jeyes' Soil Cleanser
Kill-a-mite
London Purple (arsenate and arsenite of calcium)
Paris Green (copper aceto-arsenite)
Phenyle
Pest-end (tobacco)
Qua-sul (sulphur)
R.V. 4 Soil Cleanser
See Kay (paradichlorbenzene)
Schweinfurt yellow (arsenic)
Vaporite (naphthalene)
Vermorite (basic copper acetate)
Xanthate (sodium xanthogenate).

In addition some of the more important mixtures of the above chemicals which have been tried are listed below:—

Benzine + creosote
Benzine + sinapis oil
Benzine + naphthalene
Benzine + pyrethrum
Benzine + paradichlorbenzene
Carbon disulphide + creosote
Carbon disulphide + benzol
Carbon disulphide + paradichlorbenzene
Carbon disulphide + ortho-dichlorbenzene
Carbon disulphide + kerosene
Carbon disulphide + mustard oil
Carbon disulphide + turpentine
Carbon disulphide (water emulsion)
Kerosene + pyrethrum
Naphthalene + sinapis oil.

Short notes on chemicals in use for controlling grubs, or those which show promise:—

Arsenic.—Soluble arsenic compounds cannot be used for grub destruction because they are very poisonous to plant life. White arsenic has been used considerably in the Giru area, but our trials have shown that the best kill obtained was only 70 per cent, with an application of 200 lb. per acre. With such high applications there is considerable danger in rendering the soil unfavourable to plant life. Lead arsenate is used in America for the control of grubs of the Japanese beetle in lawns by mixing the poison with the soil, but it is too expensive if it is used in sufficient quantity to destroy cane grubs.

Benzine.—Petrol has been tried on a number of occasions, but mainly as a solvent for other poisons. The best kill registered with it was about 12 per cent. Its chief value would be as a diluent for carbon disulphide. The same applies to benzol.

Carbon Disulphide.—A reliable fumigant which gives a good kill under most conditions.

Carbon disulphide + paradichlorbenzene.—Generally used as a fumigant when mixed in proportions of (1 : 1) or (2 : 1). It gives a better kill than carbon disulphide alone under some conditions such as in volcanic soils, and apparently also under wet conditions in sticky soil. It is somewhat more expensive to use than pure carbon disulphide.

Carbon disulphide + orthodichlorbenzene.—Mixtures of these two chemicals in various proportions have been tried, and the kill is somewhat similar to that obtained with carbon disulphide + paradichlorbenzene, but the ortho- compound appears to be more toxic to plant life than does the para-, and for that reason it is not used to the same extent.

Calcium Cyanide.—A granular commercial form sold under the name of "Cyanogas" was given extensive trials some years ago. In field trials kills of about 40 per cent. were registered, and on account of this comparatively low figure, and the difficulties attendant on the placement of a solid fumigant deep in the soil, it has been discarded as unsatisfactory.

A number of organic liquids which have obtained some prominence as fumigants in America during recent years have been fully tried out, but they all gave poor results. These include propylene dichlor and ethylene dichlor.

Harvesting of Non-approved Canes during 1940.

By H. W. Kerr.

THE 1938 Amendment of the Sugar Experiment Stations Acts was introduced only after full collaboration with representatives of the sugar industry. Amongst other matters, it was their wish that more adequate control of cane variety plantings should be provided than existed at that time.

When the measure came into force in October, 1938, any cane grower having any variety which at the time of planting was not approved, was, in the strict letter of the law, obliged to destroy it forthwith. It was recognised that the immediate enforcement of this section of the Act would impose a distinct hardship on such farmers, and the Minister agreed to grant all farmers a full year of grace in which to eradicate all such canes from their land.

In other words, any farmer was permitted to deliver to his mill, throughout the 1939 crushing season, cane of any variety whatever, and it would be crushed without penalty. At the same time it was clearly pointed out, both through the local newspapers and official publications received by every cane grower, that 1939 was the only year in which this privilege would operate.

Following an appeal by a number of growers in the Mulgrave and Isis areas for a further extension of one year, the Sugar Experiment Stations Advisory Board ruled, in December, 1939, that this could not be entertained, and that in 1940 and subsequent years the Act would be rigidly enforced. This ruling also received wide publicity.

Thereupon those growers who were conscientious in their efforts to observe their obligation under the Act took steps to eliminate offending fields, or to dig out stools of non-approved cane scattered throughout blocks of approved varieties. But in a number of cases the position was allowed to drift, and as the harvest season approached further efforts were made to have these permitted for milling purposes. One suggestion which was put forward provided that the value of the crop in excess of cutting costs should be devoted to patriotic funds; and while this would at least not contribute any direct gain to the farmer concerned, the patriotic funds were likely to reap a substantial benefit. Such a proposal was, of course, sure to gain support. However, it was not overlooked that acceptance of the proposal definitely granted a concession to the farmer who did not carry out the obligations imposed on him by the Act, while the man who conscientiously did his job, destroyed his cane but was not reimbursed for this expense. Where this involved the digging out of a percentage of stools in a field of otherwise approved cane, the cost was substantial.

The proposal was duly adopted and implemented, and the large majority of farmers concerned doubtless regarded themselves as fortunate in being provided with an easy way out. Later, however, an appeal was made for full harvesting costs (including haulage, trucking out, derricking, &c.) to be made. This was considered by the Advisory Board at its August meeting, and after full discussion it was decided that this be not granted.

A very important resolution was also carried by the Board, and this should be carefully noted by all cane growers. In future, the Act is to be enforced rigorously; and any farmer having varieties on his farm, after 1940, which were not approved at the time of planting must be dealt with as provided in the Act.

This must not be regarded by farmers as an attempt by the Bureau to make the position of the cane grower just so much more difficult than it is at present. As already stated, the Act was prepared to give full expression to the wishes of the industry itself, and there exist then, but two alternatives: either its provisions should be enforced, or the section which is not acceptable should be deleted. Above all, the objective is to do something which will result only in general good for the industry, and it is not equitable to enforce one section and grant exemption from others.

Cane Growers' Varietal Returns.

Each year, all cane growers in Queensland are required to prepare and furnish to the mill which they supply, duplicate statements of *all* varieties planted and harvested during the preceding calendar year. While most of these are dealt with promptly and adequately, many farmers are slow in returning the forms to their mill, while a number also fail to make their statement complete.

It should be remembered that even small areas of any variety occurring in a field must be declared. This refers notably to plantings of "experimental canes" made by the Bureau or other authorised persons.

H.W.K.

When Does Standover Cane Mature?

In recent years, the plan of two-year cropping has enjoyed renewed popularity in the southern districts of the State. Doubtless the policy is one which tends to smooth out seasonal influences on annual crushings, and results in reduced production costs to the grower.

There is one aspect of the question which many farmers have not thoroughly grasped, and that is the influence of the age of the crop on its period of maturity. Thus, although a "one-year-old" crop of P.O.J. 2878 may not be ripe until September, it may be at its peak of maturity in the following year, if allowed to standover, as early as June or July.

During the past year tests were made at our Bundaberg Station to follow the course of maturity on selected one-year-old crops of this variety, which were not harvested in 1939. The c.c.s. of one crop was 14·9 in November of that year, and with the progress of the wet season, this figure declined to 12·9 in the middle of March. Thereafter the monthly tests showed a steady increase, which reached 15·75 on the 12th July, at which time the crop appeared to be fully mature. Similar results were obtained with other fields; in each case the standover cane was at its peak at this time.

It must be pointed out that the progress of maturity of standover crops will, of course, differ from year to year, depending on the season; and in this respect, the autumn of 1940 was so abnormally dry as to induce accelerated maturity. For this reason, further data will be obtained in the coming years, to determine the influence of the weather experienced during the maturing season.

Should the recent results be substantiated, one may conclude that the farmer is not getting the best out of his standover cane if the mill does not commence crushing until virtually all of his two-year-old cane is ripe. This leads to losses both to the farmer (through declining c.c.s.) and to the miller (through having to treat over-mature crops).

We have pointed out before, and we would stress it again, that the nature and stage of maturity of the crop is the only reliable guide to the milling programme; and it is most desirable that a degree of elasticity with respect to starting date should be preserved, if possible, to take care of abnormal circumstances.

H.W.K.

Supplies of Sulphate of Ammonia.

Due to shipping dislocation, it is possible that supplies of sulphate of ammonia may be interrupted, and cane growers may experience difficulty in getting ready supplies of this important manure.

However, there is no cause for panic, and, should anticipated shipments arrive, ample stocks will be on hand for the young crops for 1941 harvest. It is, therefore, urged that cane growers purchase only their normal requirements, so that the market will not be upset, and there will be sufficient of this manure for all present needs.

It has been reported by some farmers that they were informed last summer that sulphate of ammonia was not procurable, though no difficulty existed in respect of mixtures containing about two-thirds of the nitrogen value of sulphate of ammonia. Any farmer receiving such advice this year is urged to communicate with this office, when steps will be taken to ascertain the reason for such shortage.

Cane growers can, of course, do much to help themselves for their 1941 plantings, if they will strive to grow a green manure crop on every acre of land which will be in fallow for this purpose during the coming summer. Ample supplies of seed of the popular species are available, and any grower desirous of trying Gambia pea is asked to get in touch with his local District Executive secretary regarding seed.

H.W.K.

Corn and Downy Mildew Disease.

In the course of his address to canegrowers assembled at the Annual Field Day, held at the Bundaberg Sugar Experiment Station in June last, reference was made by the Director to the necessity for the gazettal of a Proclamation designed to control plantings of corn in the Bundaberg Cane Disease Infested area. The purport of this proclamation has already been placed before canegrowers.

This announcement was received with considerable hostility by a small section of canegrowers who contended that their livelihood, as growers of corn as well as cane, would be jeopardised by the restriction. They claimed, further, that corn was not the potent factor in disseminating downy mildew disease that it was claimed to be.

It is therefore of interest to present a few figures, taken at random from the reports of inspectors operating under the supervision of the Bundaberg Cane Disease Control Board, to illustrate just how readily corn can acquire the disease, even when cane on the same farm shows little infection:—

Farm.	Locality.	Area.	Cane.	Area.	Corn.
			Diseased Stools Downy Mildew.		Diseased Stools Downy Mildew.
A	Sandhills	2	Nil	2	279
B	Gin Gin	Nil	..	½	750
C	Gin Gin	32	1	1½	51
D	Windermere	14	12	¾*	90% infection*
E	South Kolan	5	Nil	3	7
F	South Kolan	10¾	2	5	45
G	South Kolan	20½	Nil	¼	40
H	South Kolan	26	10	4	110
I	Barolin	23	4	2	103
J	Barolin	19	57	¼	225
K	Barolin	21	8	½	40
L	Barolin	30¾	15	2	158
	Totals	204	109	20½	1,808

* Not included in totals.

It should be stressed that these are not selected examples, and are by no means the worst that are available. When it is remembered that corn possesses the capacity for producing spores which will reinfect cane, the need for controlling a minor crop in favour of the major product should be obvious.

Fig. 31.—Two excellent grain sorghum heads produced at the Bundaberg Station.

Where canegrowers are not allowed to plant corn, because of the existence of downy mildew disease, they may still plant suitable varieties of sorghum; and it would appear that, as a feeding stuff for use on the farm at least, they are a better proposition than maize.

H.W.K.

The Germination of Sugar Cane.

By H. W. Kerr.

THE cane planting operation is one of the most important and most expensive items contributing to costs of cane production. It is also one which may be a complete success or an abject failure, depending upon conditions at, and immediately following, the time the job is carried out. Moreover, the factors which make for a favourable or unfavourable strike are all too imperfectly understood, by both the

agricultural adviser and the farmer; so that a contribution on the subject in a recent issue from the University of Hawaii* is of particular interest, and the major features of the investigation and conclusions are given below.

This was a most comprehensive undertaking, and involved the use of 75,000-100,000 buds (or eyes). The standard variety H. 109 was used throughout, so that due care should of course be exercised in attempting to translate these findings in terms of other varieties in this country.

Soil Temperature.—As is well appreciated, one of the dominant factors influencing germination of the seed piece eyes is temperature. We know that cane "strikes" rapidly in a warm soil, but is slow when the soil is cold. Direct field trials, involving soil temperature determinations at several depths, indicated that the germination is quick and complete only when the mean soil temperature is substantially above 70°F. As the daytime temperature of the soil usually decreases with depth below the surface, the importance of a shallow soil covering under rather cool conditions is evident. As is commonly found, a moist soil usually gives a good strike even with haphazard planting methods with summer soil temperatures, which in Queensland would frequently exceed 100°F. at the land surface.

Soil Aeration and Soil Moisture.—Where the soil was well aerated, as in very porous soil, the moisture was often a limiting factor, and under these conditions root development was poor, although the eyes developed. On the other hand, where soils showed a strong tendency to puddling, the absence of soil air (oxygen) was a harmful factor. In some such cases the eyes failed to develop, despite favourable temperatures and moisture.

It was therefore concluded that shallow planting is necessary in cool, poorly aerated, and poorly drained soils, while deeper planting is desirable in well-drained soils, especially during hot summer days. These features were clearly demonstrated by plantings made under varied conditions in one field.

Age of Seed Pieces.—The investigation threw some interesting light on this factor. The tests showed that setts cut from the upper one-third of the stick gave the quickest and best germinations; those from middles and butts were definitely inferior, in point of both speed and completeness of germination. These comments, it should be noted, are in reference to a crop which was only ten months old when cut for plants. Amongst other things it was pointed out that, the older the eye, the greater its chance of having been injured either by insects or mechanically, during its lifetime.

Length of Seed Pieces and Position of Eyes.—Some interesting data were obtained in this regard. When seed pieces containing a single eye were planted, a good germination of all eyes was obtained. In general the eye associated with the topmost internode of the stick germinated, on the average, in half the period required by the eye from the bottom of the stick. Further, the speed of appearance of the shoots was

* "Factors Affecting the Germination of Sugar Cane," by H. F. Clements. H.S.P.A. Planters' Record, Vol. XLIV., No. 2, p. 117.

substantially modified by the position of the eye—that is, whether it were planted "up," "down," or "sideways." The average periods for all eyes from the complete stick were—

	Days.
Eye "up"	10·5
Eye "down"	24·6
Eye "sideways"	18·8

However, the shoots from eyes on the lower side of the sett were generally stronger than those from the buds placed upwards.

Some very interesting results were obtained when setts carrying from one to five eyes were planted, particularly with reference to the position of the respective eyes on the planted sett. All setts planted carried apparently perfectly sound eyes, and soil and temperature conditions were very favourable.

With one-eye cuttings, the position of the eye when planted had no influence on the vigour of the shoot produced. But when there are two eyes on the sett, one affects the behaviour of the other. When the bud nearest the top portion of the sett is placed uppermost, the growth of the second eye (which is thus down) is almost completely inhibited. When the position is reversed, the basal bud is favoured, but germination of the younger eye still takes place; but when both eyes are placed sideways, equal and strong development takes place with each.

With three-eye setts, the relations are generally similar to those for the two-eye cuttings. In those cases with the topmost eye planted up, it dominates the second eye which is down and has a mild effect on the third eye which is also up. When the middle eye is up, it dominates the basal eye, which is down, almost completely, while that from higher up the stick (also down) is partially affected. When the eyes are all on the side, the germination is again better; but it was found that with setts from the older portions of the stick, the growth of the third (oldest) eye is inhibited.

Similar considerations apply to seed pieces with larger numbers of eyes; the greater the number, the lower the germination percentage of the total number of eyes. In all cases, best germination follows when the eyes are placed on the side, and the shoots are also stronger. With setts carrying six eyes, not more than 50 per cent. germinated, in general, even when all eyes were placed sideways.

It is concluded, then, that since it is impractical to plant one- or two-eye setts, three-eye cuttings planted sideways will give the best results. This conclusion in respect of the placement of the sett is largely of theoretical interest in Queensland, where machine planting is the rule; but it should be borne in mind where hand replanting is necessary to provide a good strike. On the evidence supplied, top cuttings with eyes placed on the side would assure the most rapid germination and strongest shoots.

It is stressed, moreover, that the results here discussed were obtained under the most favourable conditions; and with some tests made under cold conditions, only one eye grew no matter how the setts were placed.

Effect of Leaf Sheath on Germination.—It was found, with top eyes, that the removal of the adhering leaf sheath or trash speeded up germination and gave a higher percentage of shoots. It is pointed out, however,

that factors such as damage to soft eyes where the sheaths are removed might outweigh the other advantages of removal. On the other hand, the presence of the sheath under conditions not favourable to speedy germination may result in rotting of the eye which it covers.

Stimulation Treatment.—Recognising the importance of obtaining a complete† and speedy strike in all plant fields, studies were made of the effect of pretreatment of setts. Soaking in warm water, dipping in hot water or soaking in a warm 1 per cent. solution of calcium nitrate were all helpful, though the lastnamed was the most effective. The importance of the water dip (twenty minutes at 125°F.) was most evident. This is the treatment employed in Queensland for "curing" setts of chlorotic streak disease; it is apparently used as a uniform practice for all plants in some parts of Hawaii. The favourable effect of calcium nitrate even when used in cold water was evidently due to the influence of an increased nitrogen supply on germination. The nitrogen content of setts cut from all but the top portion of the stick are deficient in this plantfood, for best results, and this finding adds point to the experience in many parts of Queensland, that applications of a nitrogenous manure (e.g., meatworks or dried blood) in the planting furrow speeds up the strike. Top plants usually contain sufficient nitrogen.

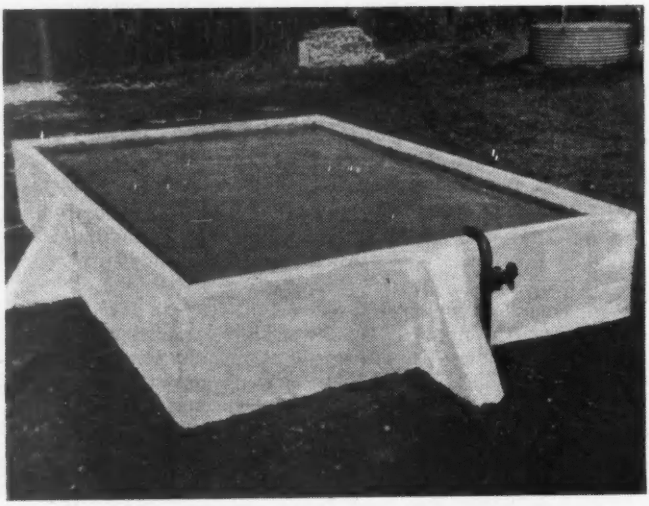

Fig. 32.—Illustrating the seed-soaking tank recently constructed at the Bundaberg Station. Facilities for filling and draining are provided.

It also emphasises the value of fallow green manuring which assures a good supply of readily available nitrogen in the soil when the cane is planted, and obviates the need for special nitrogen applications as fertilizer. On the other hand, where ploughing-out and replanting becomes necessary, the need for liberal applications of nitrogenous manure in the drill (*not* sulphate of ammonia, however) is obvious.

† Queensland studies have shown that "supplies" or "misses" seldom make a satisfactory stool. And if the stool growth is poor in the plant crop it will remain weak throughout the ratoons. It is doubtful whether planting "misses" is worthwhile, except where long gaps exist.

Though the influence of plant soaking was greatest when conditions for germination were poorest, the benefits of the treatment may be experienced even under generally favourable conditions, as was pointed out recently by N. J. King.

While the article reviewed is by no means exhaustive in its treatment of this important subject, it certainly contains much of interest, and it should suggest to our canegrower much that might be tried in an effort to secure the rapid and complete strike which is the joy of every farmer.

River Erosion in the Proserpine District.

The disastrous flood experienced in the Ayr district earlier this year was paralleled by a similar occurrence at Proserpine, where the river cut a new channel through its northern bank, and washed out a section of valuable cane land in the process.

Fig. 33.—Showing the serious break in the Proserpine River bank caused by erosion during the recent flood.

The accompanying illustration (Fig. 33) indicates the depth to which erosion has taken place. It is feared that successive floods may follow this new course, and farms which lie in its path will be endangered unless the breach can be repaired.

H.W.K.

After the Burdekin Flood.

In the July issue of the Bulletin was published a description of the disastrous flood experienced in the Burdekin district early in April last. A selection of photographs, illustrative of the damage caused to farms, was also reproduced.

During a recent visit to the area, the writer was struck by the energetic manner in which the farmers were attempting to rectify the damage they had suffered, and in many cases fields which appeared hopeless earlier in the year have been graded for irrigation and planted even where 18 inches of surface soil had been removed. In other cases, heavy sanding of fields had necessitated extensive scooping and grading, and this has also been carried out successfully.

Fig. 34.—A sanded field which had been scooped and ploughed. A thin layer of original soil has been brought up by the plough.

The illustrations printed here might be of interest to growers. Fig. 34 shows a sanded field which has been scooped, and it will be noted that a deep ploughing has succeeded in bringing to the surface 2 or 3 inches of the buried original surface soil. In cases such as this, it is recommended that alternate ploughing and scooping should be carried out, so that the land to which the sand is transferred will benefit from the admixture of surface soil which will be taken with it.

The second picture (Fig. 35) illustrates the condition of a field of plant cane which was sanded and covered with flood debris. The crop had just been harvested, leaving, of course, a heavy tonnage of cane sticks buried in the sand, which was in places 3 feet in depth. The farmer has since graded the surface as well as possible and a profusion of "ratoon" shoots have developed from the eyes of the buried stalks. By means of discs, it has been possible to destroy most of those in the interspaces, so that it will be practicable to irrigate later in the season. It is confidently expected that a satisfactory ratoon crop will be harvested and, when ploughed out next year, the farmer can undertake the task of removing some of the sand, if necessary.

The third illustration (Fig. 36) is a striking example of the benefits which some farmers experienced from silt deposits, following the flood. This picture was taken ten weeks after an earlier inspection when a deposit of silt 12 inches deep was just about ready for ploughing (*see* Fig. 19, July Bulletin).

Fig. 35.—Illustrating the extent and nature of the sanding which certain fields experienced. What remained of the mature crop had been harvested when the photograph was taken. The field has since been levelled and ratooned.

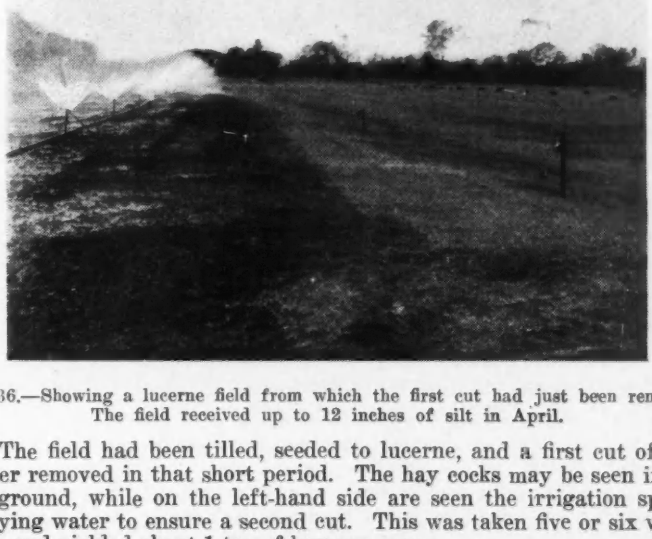

Fig. 36.—Showing a lucerne field from which the first cut had just been removed. The field received up to 12 inches of silt in April.

The field had been tilled, seeded to lucerne, and a first cut of this fodder removed in that short period. The hay cocks may be seen in the background, while on the left-hand side are seen the irrigation sprays applying water to ensure a second cut. This was taken five or six weeks later, and yielded about 1 ton of hay per acre.

H.W.K.

Gambia Pea as a Green Manure Crop.

By H. W. Kerr.

FROM time to time progress reports have been issued to keep cane growers informed regarding the trials which have been made with this green manure species, which gave promise of becoming a standard crop for green manurial purposes.

During the 1939-40 growing season a substantial number of moderate plantings were made in most cane areas of the State, and these have been the subject of close supervision by the field officers of the Bureau. Based on the reports received, the following comments are offered for the guidance of growers generally.

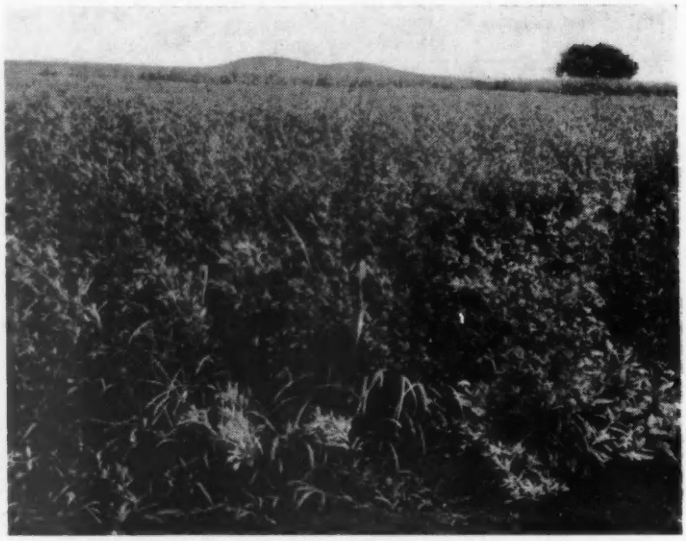

Fig. 37.—Illustrating a young Gambia pea crop at the Bundaberg Station, January, 1940.

Some fourteen trial plots were planted in the area from Mossman to Babinda, on all major soil types. While there were some disappointments, due to a variety of causes, most of the farmers are seeking seed for further plantings, this year. In some cases excellent crops were produced, exceeding 6 feet in height at maturity. One of the accompanying illustrations shows a crop grown on a Babinda gravelly slope: it will be seen that the horse plough is making an excellent job of covering it.

One major advantage which it possesses over other species in these parts is that it not only produces a heavier weight of green matter to be ploughed in, but it does not flower until April and is thus providing a cover during the period of heavy rains, by which time most legumes have seeded and died. It might be noted, in passing, that the value of these latter crops is by no means lost for this reason: but it must be

admitted that best results will follow where the succulent crop can be turned under to rot, instead of decomposing on the ground surface. Little of the valuable nitrogen will be lost due to this cause, but the mellowing effect of the decomposing organic matter on the soil is dissipated.

With plantings extended from mid-October to mid-January, the better results were obtained for the earlier plantings. Those planted late were not satisfactory. Soil type seemed to have little influence on germination and growth, as splendid crops were obtained on sands, gravels, schist, and clay loams.

Fig. 38.—Showing one of the best crops produced last year, on Mourilyan sandy soil.

Germination varied considerably. It was mostly slow, taking from one to three weeks, and in many cases it was patchy in point of both time and position in the block. It would appear that one fault lay in burying the seed unduly. A small seed such as this gives best results when covered very lightly, and some of the best germinations were obtained where the field was merely rolled after the seed was sown. However, this had no undue influence on the speed of germination, and it would appear that some experimentation is necessary to determine how this can be accelerated. Soaking the seed before broadcasting, in either hot or cold water, may be found beneficial.

In its early stages of growth the crop makes slow progress, and in general it appears that weeds and grasses would smother it. But when this initial period is past, it makes very rapid headway and completely controls its competitors.

About 10-lb seed should prove sufficient to sow an acre. Care is required to get an even spread, and it is advantageous to mix it with a proportion of dry sand or sawdust to improve the distribution. If the germination is complete, the field produces a close stand of upright plants

which give little branching. Where the stand is more sparse, the individual plants will spread and branch, covering an overall width of 2 to 3 feet.

Practically all crops flowered in April, irrespective of planting time, but seed was not set until late in May. A continuous ground cover for from five to seven months is therefore possible. Although small patches in wet fields died out, due to wilt, this trouble was not nearly so bad as is experienced in similar circumstances with Poona pea, and should definitely not be regarded as a deterrent, even in the wettest districts.

Fig. 39.—Illustrating the ease of ploughing under a heavy crop, on Babinda gravelly soil.

The ploughing under of the crop is a simple matter. Being upright in growth habit and free from runners, the touch of the plough disc turns it over. In a heavy crop at Mossman, the rubber-tyred tractor tended to slip on the heavy mat of material. The plant tissue, even when fully mature and with enlarged stems, does not offer much resistance to rotting. The stems are remarkably free from long fibre, and are rather pithy in structure.

Experience in the Innisfail district, with some fifteen plots, was generally similar to that recorded for the north. The season was by no means a good one for green manure crops generally, but the results with Gambia pea were, on the whole, satisfactory. All plantings which were made in a fine, moist seed bed and covered lightly, germinated and grew well; those made in a dry seed bed, and for the most part deeply covered, germinated poorly and produced an indifferent stand of fairly well-grown plants.

Its reaction to the heavy wet season conditions of this area appears highly satisfactory, and it is definitely superior to the green crops usually grown: the resistance to floods is remarkably good, and the

species deserves attention in respect of soil erosion prevention. One crop which was submerged for several days did not suffer any loss of plants, while an adjoining crop of Mauritius bean was practically killed off.

It is considered that best results will be obtained if seeding is carried out during November and early December, in a fine, moist seed bed, covering with a light leveller or peg-tooth harrow.

Yields estimated for those crops which made reasonable growth, ranged from 10 to 30 tons per acre of green matter. Perhaps the best crops in these parts, illustrated in Fig. 38, was produced on an area of sandy soil in the Mourilyan area.

During late 1939 it was arranged to have plantings of Gambia pea made in the southern areas of the State where legumes are grown for the purpose of seed collection. An estimate of yields from these sources indicates that 2 or 3 tons of seed will be available, and arrangements are being made for the sale of the crop in all major cane areas. Farmers desiring seed should get in touch with their local District Executive secretary, with whom we have had correspondence on the matter. The Bureau has no seed for sale, so enquiries should not be directed to the Experiment Stations or to the Brisbane Office.

To assure a seed supply in the future, we would recommend to cane growers who have well-seeded crops, to gather the pods when mature, and thrash them out after drying. It is not a particularly troublesome business. Incidentally, it is not anticipated that much difficulty will be experienced in controlling young seedlings of the species, should a crop mature seed before it is ploughed under.

Effect of War on Fertilizer Supplies.

By H. W. Kerr.

When hostilities commenced late in 1939, some fears were expressed that the normal flow of certain fertilizer supplies from overseas might be adversely affected. Potash supplies in particular were most seriously threatened. However, Australia was fortunate in being able to acquire good stocks and it appeared, early in 1940, that future supplies were assured.

The situation has, however, been substantially altered since the Mediterranean zone has been involved in war, and particularly since France has capitulated. Continuity of supply of potash is now definitely interrupted; and although existing stocks are adequate for a full year's requirements, at normal consumption levels, it is wisely felt that steps should be taken to impose certain safeguards, so that the quantity available may serve our purposes for two full seasons should this become necessary.

Anticipating such an occurrence as this, the Minister for Agriculture last year introduced a Bill into Parliament which would endow him with powers to devise and carry out a suitable rationing plan for such commodities as potash. The provisions of the Act are now operating in respect of this material.

Nature of Control Imposed.

Representatives of all branches of the Department of Agriculture conferred on the question of how the needs of all farmers could be served most effectively. In respect of the sugar industry, the following are the major conditions imposed:—(1) No fertilizer containing more than 14·5 per cent. potash can be purchased, while in no case will either muriate or sulphate of potash be sold, except in mixed fertilizer; (2) only those cane farmers cultivating areas of red volcanic soil will be able to purchase mixtures containing more than 7·5 per cent. potash, unless they possess a certificate authorising the purchase of the richer mixtures; (3) farmers of the Burdekin district will be debarred from purchasing fertilizer mixtures containing any potash whatsoever.

Effect of Control Conditions.

At first sight many canegrowers may feel that they are being unduly handicapped in respect of their fertilizer requirements. It is well known that the Bureau of Sugar Experiment Stations has designed special mixtures for canegrowers, one of which (No. 3) contains nearly 25 per cent. of potash, and the use of such a mixture has been recommended uniformly for all soils highly deficient in this plantfood. For the immediate future, these growers will be able to purchase only No. 2 mixtures, as stated, containing 14·5 per cent. potash. This "balanced mixture" (No. 2) has been a commonly recommended manure for soils deficient in both phosphate and potash; for the next season at least, farmers receiving such advice will be obliged to confine their purchases to mixtures with not more than 7·5 per cent. potash.

In the *Cane Growers' Quarterly Bulletin* for October, 1939, it was pointed out that lands on which best results were obtained with manures containing only a modest amount of potash, could well be given a mixture devoid of potash for a year or two, without impairing yields in any measurable degree. Such are the alluvial cane lands of the State. We would repeat this recommendation as a means both of saving money for the grower and conserving potash supplies. For the Burdekin alluvial soils, the need for potash has seldom if ever existed; in no trials have applications of this plantfood given any suggestions of benefit, and farmers in these parts must regard the use of potash in mixtures merely as a means of conserving soil fertility. No hardship will then be imposed if those canegrowers are required to substitute meatworks manure for drill or planting mixtures, provided, of course, they do not overlook the need for sulphate of ammonia top dressings as well. Incidentally, they should save themselves quite a reasonable sum of money in the process, and when the situation eases, they may revert to their former standard practice without detriment to soil or crops.

Use of Molasses as Manure.

In those areas where farmers are fortunate in still being able to obtain molasses for use on their fields, we would urge that they utilize the material to the best advantage. As a source of potash, 1 ton of molasses is, on the average, equal to 1½ cwt. of muriate of potash; therefore, applying 3 or 4 tons of this material per acre is a much better policy, in times of emergency, than putting on 10 tons over a proportionately reduced area. Mill executives could probably do much to see that the material is used to best advantage by rationing, if necessary, in

respect of individual needs. In no case should a field, to which molasses has just been applied, be given an application of fertilizer containing potash. Meatworks manure and/or superphosphate should be used exclusively as drill or planting manure.

Finally, if all farmers will accept this control plan in the correct spirit, it is felt that the greatest good for the greatest number will result; and in no instance will any individual farmer be adversely treated.

Approved Varieties for 1941.

It has been the practice to publish in the October Quarterly Bulletin each year the alterations which it is proposed to make in the succeeding year's list of approved varieties for each mill area. This is done for the purpose of enabling growers or organisations in each area to make suggestions as to possible modifications of the lists before they become law. The next list of approved varieties will be gazetted during the first week in January, 1941, and **once the list is gazetted it cannot be altered.** Any requests for the alteration of the proposed lists should, therefore, be forwarded to the Director immediately; such requests should be accompanied by a full statement of any evidence which may be cited in support of the case presented.

It is now proposed that the 1940 list of approved varieties should be amended as follows in respect of the following mill areas:—

Hambledon: The variety S.J. 4 will be excluded entirely as a result of the further spread of gumming disease.

Mulgrave: a. In the Mulgrave area proper Juno will be added to the list; *b.* those farms supplying Mulgrave Mill, but which are included within the Babinda Mill area, will have the same approved varieties as Babinda; *c.* the Mulgrave suppliers in the vicinity of Waugh's Pocket will have the same approved varieties as the Johnstone Mills.

Babinda: H.Q. 409 and H.Q. 458 will be dropped from the list.

Victoria and Macknade: To be discussed further with local bodies.

Invicta: (North of Townsville) Q. 10 to be added to list; (South of Townsville) S.J. 16 to be added.

Farleigh: P.O.J. 2714 to be removed.

Racecourse: P.O.J. 2878 to be approved for Racecourse farms in the Parish of Lacy; P.O.J. 2714 to be dropped.

Pleystowe: P.O.J. 2714 to be removed.

Marian: P.O.J. 2714 to be removed.

Bingera, Gin Gin, Fairymead, Qunaba, and Millaquin: Q. 25 to be added.

Moreton: H.Q. 285 to be removed.

Where no mill area is mentioned this is to be interpreted as meaning that no change in last year's approved list is contemplated for 1941.

A.F.B.

Does Fertilizer Affect the Arrowing of Cane?

From time to time attention has been drawn to the influence of fertilizer ingredients on the growth and period of maturity of cane. Thus it is well recognised that nitrogenous manures delay maturity, while applications of potash accelerate the process.

During a recent visit to the Mackay Sugar Experiment Station it appeared that the percentage of arrowing in one block bore some relationship to the fertilizer treatments which had been made on different plots of the trial. The past winter was one in which the proportion of arrowing was abnormally high in practically all districts, but while certain of the plots appeared to have arrowed almost completely, the proportion of flowers was very light in others.

Counts were therefore carried out by the Chemist in Charge, and the following figures were obtained in respect of the individual fertilizer treatments:—

Treatment per Acre.	Percentage Arrowed Stalks.
No sulphate of ammonia	71
200 lb. sulphate of ammonia	54
400 lb. sulphate of ammonia	11

These illustrate very strikingly the influence of sulphate of ammonia on the degree of arrowing of the crop, and they emphasise the importance of applications of the correct manures in the correct proportions for best results. A stalk which has arrowed can make no further growth (except by "side-shooting"), no matter how favourable the growing conditions may be. In a favourable spring season, then, unarrowed stalks possess the virtue that they may take advantage of beneficial growing conditions until they are harvested.

Varying amounts of phosphate and potash were also included in the experiment referred to, but these plantfoods appear to be without influence on arrowing.

H.W.K.

Rubber-tyred Farm Equipment.

In an issue of the Quarterly Bulletin, published two years ago, attention was directed to the advantages offered by farm vehicles when equipped with rubber tyres. On a recent visit to the Mackay district the writer was interested to observe that a number of cane growers at that centre are now employing rubber-tyred truck waggons. All who were spoken to in the matter expressed themselves as very well pleased with the results obtained. They made for speedier work, and were very much lighter on the horses than the steel-tyred waggons previously used.

To date little has been done in the development of the trailer or semi-trailer as a means of economising in cane haulage costs. In many parts farmers cover long haulage distances over roads free from difficult grades and under these conditions a trailer would make for economy in both time and man power. With petrol rationing in operation, it is probable that more will be seen of such accessories in the near future.

H.W.K.

A. H. Tucker, Government Printer, Brisbane.